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January 11, 1965

Code - Nov

Miss Winnie M. Morgan
Technical Reports Officer
Grants and Research Contracts Division
Office of Space Science and Applications
National Aeronautics and Space Administration
Washington, D. C. 20546

N65 82098

CR 60734

Dear Miss Morgan:

This letter is the (semi-annual status report) covering my NASA Contract NsG-357/05-005-004. I am reporting here on work carried out in the period April 1 - September 30, 1964. During this period I have been carrying out research, together with Robert Gould and Margaret Burbidge, on a number of the topics described in the proposal. The following papers which have been completed with the support of my contract in this period are:

1. A Study of the Velocity Field in M 82 and Its Bearing on Explosive Phenomena in That Galaxy, by E. Margaret Burbidge, G. R. Burbidge, and Vera C. Rubin, Ap. J., 140, 942, 1964.
2. NGC 2188, A Peculiar Southern Galaxy, by V. C. Rubin, E. M. Burbidge, and G. R. Burbidge, Ap. J., 140, 1304, 1964.
3. Theories of the Origin of Radio Sources, by E. M. Burbidge and G. R. Burbidge, IEEE Trans. on Mil. Electronics, MIL-8, July-Oct., 1964, p. 165.
4. The Velocity Field in M 51, by E. M. Burbidge and G. R. Burbidge, Ap. J. (in press).
5. The Rotation and Mass of NGC 7331, by V. C. Rubin, E. M. Burbidge, G. R. Burbidge, D. J. Crampin, and K. H. Prendergast, Ap. J. (in press).
6. High Energy Cosmic Photons and Neutrinos, by R. J. Gould and G. R. Burbidge, presented at the I.A.U. Symposium on "Astronomical Observations from Space Vehicles" in Liege, August, 1964 (to be published in Annales d'Astrophysique).
7. Ultraviolet Emission from Galaxies, by E. M. Burbidge, presented at the 4th session of I.A.U. Symposium No. 23 on "Astronomical Observations from Space Vehicles" in Liege, 1964 (to be published in Annales d'Astrophysique).
8. The Contraction of Molecular Hydrogen Protostars, by Robert J. Gould, Ap. J., 140, 638, 1964.
9. Infrared Emission Line from Celestial Sources, by R. J. Gould, presented at the I.A.U. Symposium on "Astronomical Observations from Space Vehicles" in Liege (to appear in Annales d'Astrophysique, November, 1964).

January 11, 1965

10. Cosmic X- and Infrared Rays as Tools for Exploring the Large-Scale Structure of the Universe, by D. W. Sciama and R. J. Gould, Ap. J. (in press).
11. Infrared Radiation from B Stars, by E. P. Ney and R. J. Gould, Ap. J., 140, 388, 1964.

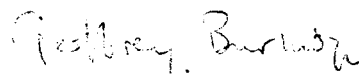
During this period I attended the I.A.U. Symposium on Observations from Space Vehicles in Liege, Belgium; the I.A.U. Symposium on the Abundance of the Elements in Utrecht, Holland; and the General Assembly of the I.A.U. in Hamburg, Germany, all in August, 1964. Dr. Gould also attended the symposium in Liege and the General Assembly in Hamburg. At the symposium in Liege Dr. Gould and I were asked to present an introductory report on the theoretical aspects of X-ray and γ -ray astronomy which is included as number 6 of the papers listed above. In addition, Dr. Gould made a contribution on infrared astronomy which is listed as number 9 above.

During this period also Dr. Margaret Burbidge and I collaborated with W. A. Fowler and F. Hoyle in Cambridge, England, where we made progress in the development of a new theory of nucleosynthesis applied to the magnetic stars. A paper on this topic is in preparation. Also, in collaboration with Dr. Gould, I am writing an article on X-rays and γ -rays for the Handbuch der Physik (Cosmic Rays II).

A student, Wallace Tucker, is working under my direction on the theoretical aspects of X-ray astronomy. Also, the program of extragalactic astronomy, as it is described in the NASA proposal, is being continued, as is seen from the list of papers which have been completed in this period.

Copies of all of these papers have been sent to your office.

Sincerely yours,



Geoffrey Burbidge

GRB:jsf